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EDITORIAL

Fruit Production Survey in Malacca.

The article entitled "A Survey of Fruit Production in Malacca Territory" which is included in this number, gives an account of the first occasion on which the survey method has been applied systematically to the investigation of the general status of a minor agricultural peasant industry in Malaya.

The conclusion arrived at from casual observation of small fruit holdings in Malaya, that the majority of peasant cultivators plant fruit with the primary object of supplying their own household requirements and that their methods of culture and marketing are highly primitive is substantiated by the findings of the survey in Malacca, where only 37.6 per cent. of the 154 fruit holdings observed throughout the territory, made a practice of selling their produce.

An estimate of the annual revenue from one acre planted with durian, jack fruit, rambutan, bananas and pineapple, based on average figures obtained from the survey and with conservative yields and prices, shows that a profit of $82.10 per acre should be obtainable and since the average size of the fruit holdings under observation was 3.3 acres, it would appear that, theoretically, if all the fruit were sold, an income of approximately $240/- per holding, per annum, might be expected.

An important factor in the marketing problem is that of the indebtedness of the grower to shop-keepers or money lenders. The survey discloses the fact that 23 per cent. of the owners of the 159 small-holdings are in debt and that frequently their entire produce passes into the hands of their creditors.

Although this survey cannot be said to bring to light any information on fruit cultural practices which might be of general benefit, it does, however, elucidate a considerable amount of interesting information on the present conditions of the industry in Malacca.

The success of this method of investigation may be said to justify fully its application in the future over a wider field.

There are, at the present time, in Malaya considerably more than 50,000 acres under fruit cultivation, exclusive of the many small kampong plots of interplanted trees. In consideration of this figure, the sum of approximately two and a half million dollars, which represents the total value of all fruit, fresh

dried and preserved imported into the country during 1931, seems disproportionately high.

Although many of the imported fruits are such as cannot be grown in Malaya, one feels that with an improvement in methods of cultivation, systematic grading and packing and better organised marketing, the local demand for Malayan produce would increase considerably, fresh fruit of good quality being more popular than that which is dried or otherwise preserved.

In spite of the facilities for transport in the Peninsula, it frequently happens that the distribution system becomes disorganised, as for example in the month of June of 1932, when in Province Wellesley and Penang there was a glut of durian and mangosteen which overloaded the local markets to such an extent that much of the fruit was unsaleable, while at the same time in Kedah these fruits were only beginning to appear on the market and in the Negri Sembilan the durian crop was poor and mangosteen had not ripened.

In order to obviate the possibility of such contingencies occurring in the future, contingencies which do much to discourage the grower from personal enterprise, it would appear desirable that some intelligence system should be organised, based on a more intimate knowledge of the factors governing the fruit industry, whereby information as to fruit prospects in different localities might be made available to some central organisation by which distribution and sale could be arranged on co-operative lines.

Insect Pests of Tobacco in Malaya.

This article is the third to appear in consecutive numbers of the *Malayan Agricultural Journal* on the subject of tobacco cultivation in Malaya. Since the depredation of insects is one of the most difficult of the problems which beset the cultivation of this crop, a recognition and a knowledge of the methods of control of tobacco pests should prove of considerable interest to growers, more especially when the increasingly large areas now being planted are certain to cause correlative incidence of the insects which prey upon the crop.

The caterpillars of certain varieties of moths are the most serious of the pests which attack the tobacco plant. Ten of the types more commonly met with are described in detail in this article together with lists of their alternative host plants. This information, together with a knowledge of the fungoid and bacterial diseases of tobacco, is of great value in the planning of a crop rotation for areas in which it is intended to cultivate tobacco.

Since natural enemies of tobacco pests have not been frequently observed, it follows that artificial control measures are of the utmost importance, and without an understanding of the habits of any agricultural pests no such measures can be effectively carried out.

The factor of the combating of pests should be borne in mind by the prospective large scale grower, for an equal amount of attention must be given to this problem in a large as in a small area and it is obvious that the labour required for such measures as the hand picking of caterpillars would, in anything but a market garden plot, be very considerable.

Original Articles.

A SURVEY OF FRUIT PRODUCTION IN MALACCA TERRITORY.

BY

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Introduction.

Until quite recent years, the only methods available for investigating the state of an agricultural industry or part of an industry were the well known Cost Accounting and Financial Accounting methods. Such methods were universally employed although recognised as unwieldy, costly and of doubtful accuracy.

It is not proposed here to describe these methods in detail, but, in essence, they consist of making detailed and lengthly costings of the different sources of income for a particular industry, treating any information emanating from the producer as of no value, and relying almost entirely on the capability of the particular person or persons engaged in the investigation to estimate such items as the residual value of manures, depreciation of stock etc.

These methods, though accurate enough for many industries, must necessarily fail to produce a true picture of the case when applied to agriculture, where it is almost impossible to apportion true values to the many contributing factors. Moreover, the method necessarily meant a detailed examination of each unit of production, so that the process of investigating a whole industry was an extremely laborious one, and the results seldom justified the amount of energy and time expended.

The Survey Method.

The appearance of what is now known as the Survey Method has led to a very decided change in the field of agricultural research. Emanating originally, it is believed, from America, the method was studied by research workers in England, and has been tested in different parts of the world. It is now in common use by the Agricultural Economic Research Institute of Oxford University and has been usefully employed in examining various industries such as dairy and mixed farming in England, the cocoa industry of Trinidad, cocoa and other industries in the Gold Coast and the sisal industry of East Africa.

The method adopts as its basic principle that, in any one industry which has been in existence for a number of years, there must be a number of esta-

blished practices which are of definite value to that industry and which are the result of accumulated experience. That is to say, the producer is in possession of certain facts which, if extracted and correlated in a reasonable order, will be of value to others.

In practice, a large number of units of production, whether small holdings, farms, or estates, are selected for study. The number is large enough to permit of its being split up into groups of units which show similar characteristics, such as those of soil, climate, rainfall, distance from market, methods of production and prices obtained. The information required for the survey is obtained by personal visits to the holdings under survey and is supplied by the producer himself. For the purpose of making records which are capable of being subjected to rapid and accurate analysis, the investigator employs a field-form or questionnaire, drawn up to suit the problem in hand, and tried out on several holding experimentally previous to the commencement of the survey. It will depend upon the nature of the problems to be investigated, the type of producer met with and the amount of information available, as to whether the actual field questionnaire is used in the field or whether rough notes are to be made and afterwards entered up on the field form.

The information extracted by the above methods is collected and analysed. It will soon become evident to the investigator that certain methods of production are in use amongst certain groups and different methods amongst others. Further detailed examination of the field forms will give an idea of the economic success or otherwise of these groups. If one group is financially sound, and another group is not, and, except for one factor, the conditions in both groups are the same, it is evident that the unsuccessful group can be advised to follow the methods employed by the other. In other words, sound economic agricultural practices are revealed by the analysis and these practices are then described and recommended to producers who are employing non-economic methods. Such, in brief, is the outline of the Survey Method.

In the tropics one meets with very different conditions from those obtaining in temperate lands. Agricultural methods are more primitive, the standard of education is lower and the spirit of competition is less keen. As a comparatively rapid method of studying conditions in a branch of an industry in the tropics, however, the method is to be recommended, since it places on record a number of facts which call attention to the urgent needs of that industry.

In order to test the applicability of the method and to gain information regarding a valuable native industry, a survey of fruit production by the peasant was undertaken by the writer, in Malacca Territory. The staff employed was the existing staff of the Department of Agriculture in that area, and although the Officers concerned had no experience of work of this kind, the results obtained were definitely encouraging.

Methods Employed.

Malacca Territory is divided into three administrative districts, Central,

Alor Gajah and Jasin, each of which has a Malay Agricultural Assistant in charge. After instruction in the objects and methods of the investigation, each assistant was supplied with a number of field survey sheets, which had been found to be suitable. A total of 154 holdings was surveyed, this being equivalent to two holdings per mukim. The field-form employed is designed to give information regarding the average number of trees, yield, source, and price of planting material, place of sale and price obtained, of each of the forty fruits listed. In addition, there are columns for information regarding the owner himself, his name, nationality, whether indebted and if so to whom, as well as the size, situation, soil, aspect, and distance from town or market, of his holding.

In practice it was found that information regarding yields was difficult to obtain and producers exhibited a certain reluctance in disclosing their financial status. These constituted the two chief difficulties encountered thoroughout the survey.

Re-surveys were performed by the writer from time to time in order to check the work of the assistants and it was found that the information was reasonably accurate.

In addition to the above, two holdings which appeared to be better than the average, were surveyed in detail, actual counts of the number of trees present being made, accurate yield figures taken and all other relevant information recorded. From these figures it was possible to obtain a fairly accurate estimate of the amount of income from a good fruit holding in bearing.

A further investigation into market prices and "kampong" prices was also made.

Results.

The information obtained in the Survey may be classed under two headings as follows :—

1. Information which was obtained as a result of observation and personal inspection during the field work.

(*a*) Fruit growing, to a greater or less extent, is practically universal amongst Malays.

(*b*) Fruit production on Malay holdings is in a primitive state.

(*c*) The practice of "marcotting" is fairly common amongst Malays.

(*d*) Chniese holdings are almost invariably in a more flourishing condition than Malay holdings.

(*e*) Chinese holdings in Malacca are not owned for money-making purposes, but for family consumption.

(*f*) Fruit production amongst Malays has increased since the decline in rubber prices. The fruit, however, is usually grown for home consumption purposes.

(*g*) Marketing methods leave much to be desired since they place the producer in the hands of the middleman, who is usually a Chinese. The fruit sold locally in the Kampong commands a very low price and the producer is usually in the hands of the shop-owner.

(*h*) The unit of production is very small, and this militates against the producer's bargaining power.

(*i*) No attempt at co-operative sale or marketing was met with during the investigation.

(*j*) Fruit grown by Malays is grown primarily for home consumption. Any surplus above the amount required in the household is at very low prices.

(*k*) A common Malay method of treatment for fruit trees is to allow secondary jungle to develop under the trees and to cut it back during the fruiting season.

(*l*) Planting methods are extremely primitive.

(*m*) Much damage to fruit trees is occasioned by squirrels and flying foxes. Very little attempt at combatting these pests is ever made by the Malay.

(*n*) Serious damage by diseases appears to be rare.

(*o*) Chinese holdings where regular spacing is adopted, good planting material used, manuring performed and adequate supervision provided, give much better yields than holdings not so treated.

(*p*) Malays will admit that it is possible to obtain a fair profit from fruit, but appear to be ignorant of methods of good husbandry.

(*q*) The practice of "letting" certain high yielding trees in a holding to more industrious Malays or to Chinese, is fairly common amongst Malay owners.

2. Information which was obtained from the field forms used.

See Tables 1, 2, 3 and 4.

Analysis of the completed field sheets gave information on the following points :—

(i) The percentage of holdings on which manuring was practised.

(ii) The percentage of occupiers in debt.

(iii) The average acreage of all holdings surveyed.

(iv) The percentage of holdings for which planting material had been purchased.

(v) The most common fruits grown in Malacca.

(vi) The percentage of holdings from which fruit was sold.

(vii) The average price obtained in the kampong for the commoner fruits.

(viii) The average prices obtained in the market for each of the common fruits in Central, Alor Gajah and Jasin Districts of Malacca.

Table I.

Information Obtained from Field Sheets.

District.	Column 1. Percentage of holdings on which manuring is attempted. per cent.	Column 2. Percentage of owners or occupiers in debt. per cent.	Column 3. Average acreage of holdings.	Column 4. Percentage of holdings on which planting material was bought. per cent.	Column 5. Percentage of holdings from which fruit is sold. per cent.
Central	13	25	3.42	27	30
Alor Gajah	25	23	2.50	18	43
Jasin	29	20	4.34	16	40
Average	22.5	23	3.3	21	37.6

Table II.

The Ten Commonest Fruit in Malacca.

Name of Fruit.	No. of holdings on which represented. (Total number of holdings 154)
Coconut ...	153
Rambutan ...	126
Durian ...	123
Banana ...	116
Mangosteen ...	112
Jack Fruit ...	97
Langsat ...	93
Bachang ...	82
Rambai ...	79
Mango ...	67

Discussion of above results.

(i) From Table 1 column (i) will be seen that on 22.5 per cent. of the holdings surveyed some attempt at manuring was made. Usually this was of a very primitive kind but the figure serves to illustrate the extent to which the cultivators realise the need for enriching the soil for fruit growing. Often the manure consisted of cut grass and small undergrowth placed round the base of the trees and allowed to rot, while in other cases cattle and pig manure was deposited around the roots. In many cases, manuring was carried out primarily for the growth of vegetables which were planted under the fruit trees.

(ii) Column 2 Table 1 shows that approximately one quarter of the number of cultivators were in debt at the time of the survey. They were indebted, almost invariably, to Chinese shop keepers and to Chettiars. The extent of their indebtedness was not, in most cases, investigated, but usually debts were large enough to ensure that the debtor sold all his produce to or through his creditor, thereby placing himself in the hands of the latter. This figure of 25 per cent. is almost certainly below the true figure since many holders would not admit debt and all doubtful cases were recorded as "not in debt". The figure is, however, high enough to indicate the urgent need for reform in this direction.
(iii) Column 3 table 1 gives the average acreage of the 154 holdings surveyed as 3.3 acres and is probably quite an accurate figure. The general opinion of many producers was that anything less than 5 acres was too small a unit for profitable fruit production, but as will be seen later, this is probably not the case.
(iv) The percentage of holdings for which planting materials had been bought, is given in Column 4, table 1 as 21 per cent. This figure is surprisingly high, considering the primitive state of the industry. The planting material bought consisted of coconuts and chiku marcots from selected local fruit holdings, and rambutan seedlings from Penang. The extent to which the Malay is prepared to import fruit planting material from outside his district is illuminating and points to the need for providing adequate supplies of these stocks for him at reasonable prices.
(v) Table 1 Column 4, gives the percentage of holdings from which fruit was sold. The amount sold was usually very small and represented the surplus above that needed for home comsumption. Many complaints of the unjust treatment the producer received at the hands of the shop keepers were met with, but in all fairness it must be stated that often the low prices obtained were due to the smallness of the amount of fruit available, its poor quality (since the best was usually consumed in the household) and the irregularity of the supply. No attempt at grading or co-operative sale was met with.
(vi) Table 2 gives a list of the 10 commonest fruits in Malacca as judged by the frequency of their occurrence in the holdings. Coconuts are practically universal, but for the most part the palms are old and poor yielding and attempts at improving either the yield or the quality of the product were rare.

Rambutan and durian are very popular as a native fruit and find a ready sale during the season. Durian trees are often "let" to other Malays or to Chinese during the fruit season. Bananas are popular because they offer a more or less constant supply of food and a little cash to the owners, but are usually of inferior quality, considered from a European stand point. One rather surprising figure is that for the mango. The fruit is liked both by European and natives if of good quality but this is so variable a factor that the question of improvement by growing only selected stocks is an important one. The same applies to a greater or less extent to most of the fruit trees in Table 2.

Table III.

Kampong and Market Prices of Fruit.

Name of Fruit.	Av. Kampong Price.	Av. Market Price
Coconut ...	1—2 cts. each	2—3 cts. each
Rambutan ...	5—10 cts. per 100	15—20 cts. per 100
Durian ...	3—6 cts. each	5—10 cts. each
Banana ...	90 cts. to $1.60 per picul	90—$2 per picul
Mangosteen ...	10—15 cts. per 100	20—30 cts. per 100
Jack Fruit ...	20—30 cts. each	30—45 cts. each
Langsat ...	8—10 cts. per gantang	15—20 cts. per gantang
Bachang ...	½—1 ct. each	1—2 cts. each
Rambai ...	2—3 cts. per gantang	5—8 cts. per gantang
Mango ...	1½—2½ cts. per 10	4—5 cts. per 10

(vii) Table 3 indicates the difference between the average kampong prices and and market prices. These figures indicate that there is a large discrepancy. The presence of two, three, or even more middlemen between the producer and the consumer is largely responsible for this discrepancy. The fruit may be passed from the holding to a shop keeper, from a shop keeper to a lorry owner, from a lorry owner to another shop keeper by whom it is sold. Such a process naturally reflects on the prices obtained.

On the figures given in the field sheets and with low yields and prices, as a basis, an estimate is given below of the amount of revenue it would be possible for a producer to obtain from a fruit holding where all the fruit is sold. The holding is a theoretical one, built up from figures actually determined in the field and represents what could be done without any special trouble or care on the part of the producer.

¼ acre Durian = 6 trees @ 40 feet x 40 feet planting distance.
¼ „ Jack Fruit = 12 „ „ 30 „ x 30 „ „ „
¼ „ Rambutan = 9 „ „ 35 „ x 35 „ „ „
⅛ „ Bananas = 54 „ „ 10 „ x 10 „ „ „
⅛ „ Sarawak Pineapple = 218 plants @ 5 „ x 5 „ „ „

Durian, 6 trees yielding 70 fruits per tree per annum @ 6 cts. each = $25.20
Jack Fruit, 12 trees yielding 6 fruits per tree per annum @ 30 cts. each = $21.60
Rambutan, 9 trees yielding 600 fruits per tree per annum @ 15 cts. per 100 = $ 8.10
Bananas, 54 trees yielding 1 bunch per tree per annum @ 10 cts. per bunch = $ 5.40
Sarawak pine, 218 plants yielding 1 fruit per plant per annum @ 10 cts. per fruit = $21.80

Total = $82.10

The total income from this holding of 1 acre is, then, $82.10. Since the average size of holding in Malacca is over 3 acres, one can therefore assume that the average producer, were he to sell all his fruit, would obtain, as a minimum, approximately $240.00 from his holding per annum. The probability is that he could obtain much more with a little care.

The above theoretical holding could, of course be planted up with a greater variety of types of fruit, with advantage, but the foregoing figures serve to illustrate the possibilities of fruit growing for the Asiatic small-holder.

The above estimate of income from a theoretical holding was made prior to a detailed survey of two good holdings. Since that time, it has been possible to obtained actual figures for yield from two such holdings and it is of interest to note that the theoretical estimate approximates fairly closely to the results, from an actual holding. One of the holdings surveyed in detail was somewhat immature but the estimated value of yield from it was $155.00 while the other holding, which was in actual bearing, gave an estimated income of $342.00—an average for the two of $228.00.

It would appear, therefore, that the survey method, in addition to having supplied certain information of value, is sufficiently accurate for the purposes of actual investigation.

(viii) Table iv gives the market prices of a large number of fruits in the three Districts, Central, Alor Gajah and Jasin, and affords an interesting comparison with the kampong prices. There is obviously an urgent need for reform in marketing methods.

Conclusions.

The following conclusions may be drawn from the information collected during the Survey :—

1. Fruit growing as at present practised by the peasant is a primitive industry. No attempt at large scale production is made and general agricultural methods leave much to be desired.

2. The marketing of the produce is not at all satisfactory for the following reasons.—

(i) The fruit is not grown primarily for the market but for home consumption.

(ii) The indebtedness of the producer to shop-keepers and money lenders.

(iii) The ignorance of the small-holder of better methods of husbandry.

(iv) The smallness of the unit of production does not allow of adequate bargaining power on the part of the producer.

(v) The presence of an excessive number of middlemen between the producer and the consumer tends to lower the selling price and increase the buying price.

3. There is definitely a local market for many Malayan fruits provided they are of good quality.

Table IV.

Market Prices for all Fruit in various Districts.

Fruit.	Price in Alor Gajah.	Price in Jasin District.	Price in Central District.
Coconut ...	2 cts. each	2½—3 cts. per fruit	2—3 cts. per 10
Mangosteen ...	4½ cts. per 10	4—5 cts. per 10	2—3 cts. per 10
Rambutan ...	15 cts. per 100		15—20 cts. per 100
Chiku ...	5 cts. per 100	1—2 cts. per fruit.	
Banana ...	12 cts. per bunch	10—30 cts. per bunch	90—$2 per picul
Duku ...			
Pomelo ...			
Orange ...			
Lime ...		1 ct. per 6 fruits	
Pulasan ...	25 cts. per 100		20—25 cts. per 100
Papaya ...			
Pineapple ...	2 cts. each	15 cts. each Sarawak	15—25 cts. each
		1—2 cts. each ordinary	1—1½ cts. each
Durian ...	6 cts. each	5—13 cts. each	5—10 cts. each
Jack Fruit ...	25 cts. each	1 ct. per slice of 2—3 pulps	40—45 cts. each
Langsat ...			15—20 cts. per gantang
Belimbing Saji ...			
Belimbing Buloh			
Rambai ...			5—8 cts. per gant.
Bachang ...	1½ cts. each	1 ct. per fruit	1—2 cts. each
Rokam ...		2 cts. per 30 fruits	
Durian Belanda	5 cts. each	5—6 cts. each	5—6 cts. each
Jambu Biji			
Jambu Ayer ...		3 cts. per 30 fruits	10—15 cts. per 100
Ramai ...			10—15 cts. per gant.
Nona ...	3 cts. each		20—30 cts. per gant.
Chermai ...			
Binjai ...	2 cts. each		7—10 cts. per 10
Lanjot ...			
Champedak ...	6 cts. each		8—10 cts. each
Sukon			
Jering ...	4—5 cts per 50		10—15 cts. per 100
Mata Kuching ...	$5 per picul		
Mango ...			4—5 cts. per 10
Petai ...	5 cts. per 10 pieces		15—20 cts. per 100

4. Few Malays seem to consider fruit production seriously as a source of revenue, but in a few cases, always when the producer appeared to be more enlightened then the average, attempts have been made at better agricultural methods, with encouraging results.

5. The present time is admirably suited to propaganda and instruction on fruit growing, owing to the fact that rubber cultivation is unremunerative.

6. The survey method of investigation has proved itself to be satisfactory.

No common practices of great value have emerged from it, so that the necessity for dividing up the number of holdings into groups does not arise. The information collected serves to illustrate the primitiveness of the industry and the need for improvement. The income possible from a holding of three acres is a point that may be noted and those cultivators who are doubtful as to the possibilities of fruit growing should find this information useful in a practical way. A fairly accurate picture of the state of the industry has been obtained in a comparatively short space of time and a number of ways in which reform might be effected can be clearly seem.

Suggestions for the Improvement of the Industry.

(1) Good planting material at low prices should be made available to cultivators at reasonable prices.
(2) Instruction in fruit production methods should be part of the course in School Gardens.
(3) In conjunction with the Cooperative and Administrative Departments, an attempt at solving the problem of the indebtedness of the producer should be made.
(4) Attention is drawn to the need for improved marketing systems, whether by co-operative or Government financed shops or stalls, or other methods.
(5) Instruction in packing and grading methods should be given to the peasant.
(6) The possibilities of extending the markets for local fruits overseas need investigation.

In conclusion the writer would like to thank the Agricultural Field Officer, Malacca for his assistance and cooperation in the carrying out of the Field work.

INSECT PESTS OF TOBACCO IN MALAYA.

BY

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Introduction.

In every part of the world where tobacco is cultivated, planters have to contend with numerous pests, principally moths (Lepidoptera). Many of these are found in most parts of the world and attack a number of plants.

Insects attacking tobacco in Malaya belong to the Orders grasshoppers (ORTHOPTERA), sucking bugs (HEMIPTERA), moths (LEPIDOPTERA) and ants (HYMENOPTERA). Of these, the most important in Malaya is the Order LEPIDOPTERA.

The caterpillars of the moths fall into the categories of leaf or seed pod feeders, stem borers, and cut-worms, so called from their habit of biting through the stem of a plant at ground level, thereby causing it to collapse.

The Orthoptera which attack tobacco in Malaya are represented by *Atractomorpha crenulata* F. (Acrididae, Pyrgomorphinæ), a moderately slender insect from three quarters to one inch in length, having a green or greenish brown head and body, green forewings and pinkish hindwings. It is not a serious pest.

Two Hemiptera only, (Capsidæ),—*Dicyphus* sp. and *Engytatus volucer* Kock. have so far been recorded.

These are very small insects, which, in the larval and adult stages suck the sap from the leaves and stems.

Engytatus volucer is suspected of being a cause of "leaf curl" (crinkle). It would appear, however, that leaves of plants grown on poor soil are more susceptible to this form of malformation, especially when the bugs are numerous and consequently are causing extensive mechanical injury by their sucking and injection of saliva.

This species has not so far been found in great numbers in Malaya.

Only one member of the Hymenoptera, an ant *Solenopsis* sp. is frequently troublesome, in that it carries away to its nest freshly sown seed.

This paper is based on the results of direct observations made by the writer and on notes made by various members of the Division of Entomology, Department of Agriculture, S.S. and F.M.S.

Descriptions.

Prodenia litura F. (Figs. 15, 16, 17).

The eggs of this species are deposited in groups on the leaves of the food-plant, and are covered by the female with a quantity of buff coloured hairs from her abdomen.

On hatching, the caterpillars are blackish green. For a few days they live gregariously, then separate to feed singly on the leaves.

They measure when full grown about 2 in. in length, and have then, interrupted longitudinal yellow stripes and brownish crescent shaped markings on the back, also a dark brown spot on the first and near the last abdominal segment.

The caterpillar stage lasts for about three weeks. Pupation takes place in the soil, and roughly a week elapses before the emergence of the moth.

The moth measures from one and a half, to one and a three fifths inches across the forewings, of which the pattern is a complicated mixture of whitish yellow stripes, black spots and shading, and shades of bluish grey. The hindwings are white and somewhat iridescent.

This species feeds on a great number of different food-plants, besides tobacco, among which may be mentioned, cotton, groundnut, maize, tomato, potato, castor, banana, beans and rice.

Agrotis ypsilon Rott. (Figs. 18, 19, 20).

This species, commonly known as the "greasy cutworm", is widespread in its distribution, and its caterpillar is almost an omnivorous feeder.

Among the plants sought out by this insect for food are grasses, lettuce, maize and cotton. It has, moreover, been reported as feeding on almost every kind of cultivated plant.

Egg-laying takes place on the leaves of the food-plant, the eggs taking, as a rule, three days to hatch.

The caterpillar stage lasts twenty-six days, then the caterpillar, if it has fed on grass, constructs a cocoon of grass and silk, but when it has fed on other plants, the rule is for it to enter the soil and make a cocoon of earth and silk.

When full grown, the caterpillar measures about two and one third inches in length, and is greyish or brownish with some black spots on the sides and back. The under surface is somewhat paler.

Feeding takes place at night, and during the daytime, the caterpillar conceals itself in the soil or among debris at the base of the food-plant.

After eight or nine days in the pupal stage, the adult moth emerges. It measures one and three quarters of an inch in expanse, with ashy brown forewings having irregular black markings, and whitish hindwings with smoky margins.

Chloridea (*Heliothis*) *obsoleta* F. (Figs. 10, 11, 12).

The caterpillar of this species feeds both on the leaves and the buds of the tobacco plant, as well as the petals and seeds.

When the time for pupation arrives, it enters the soil and prepares a flimsy cocoon therein.

The caterpillar is brown or greenish with paler longitudinal stripes. When full grown it is about one and a half inches long.

The moth is yellowish brown, with reddish or yellowish tranverse narrow stripes on the forewings.

EXPLANATION OF PLATE.

Fig. 1 *Psara submarginalis* Swinh. adult.
„ 2 *Psara submarginalis* Swinh. caterpillar.
„ 3 *Psara submarginalis* Swinh. cocoon.
„ 4 *Phthorimaea heliopa* Low. adult.
„ 5 *Lamprosema diemenalis* Guen. adult.
„ 6 *Apanteles inquisitor* Wilkn. adult.
„ 7 *Lamprosema diemenalis* Guen. cocoon.
„ 8 *Chloridea* (*Heliothis*) *flavigera* Hamps. adult.
„ 9 *Chloridea* (*Heliothis*) *assulta* Guen. adult.
„ 10 *Chloridea* (*Heliothis*) *obsoleta* F. adult.
„ 11 *Chloridea* (*Heliothis*) *obsoleta* F. caterpillar.
„ 12 *Chloridea* (*Heliothis*) *obsoleta* F. chrysalis.
„ 13 *Plusia signata* F. adult.
„ 14 *Plusia chalcites* Esp. adult.
„ 15 *Prodenia litura* F. adult.
„ 16 *Prodenia litura* F. caterpillar.
„ 17 *Prodenia litura* F. chrysalis.
„ 18 *Agrotis ypsilon* Rott. adult.
„ 19 *Agrotis ypsilon* Rott. caterpillar.
„ 20 *Agrotis ypsilon* Rott. chrysalis.
„ 21 *Cosmolestes picticeps* Sta. adult.
„ 22 *Chelonus* sp. adult.
„ 23 *Podomyia setosa* Dol. adult.

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Tobacco, although eaten by this insect, is not its favourite foodplant, maize being more commonly attacked. It will, however, attack cotton, castor, rice and some other plants.

The duration of the pupal stage is twelve days.

Chloridea (*Heliothis*) *assultæ* Guen. (Fig. 9).

A leaf feeder and rather a serious pest. The caterpillar is green with a yellowish green head, and with small black spots along the sides of the body.

In the field, the caterpillars of this species injure tobacco plants by eating holes, varying from one half to one inch across, in the leaves. The only alternative food-plant, as far as one has been able to ascertain, is groundnut.

Pupation takes place in the soil in a lightly constructed cocoon.

There is a close resemblance between the adult of this species and that of the next species *H. flavigera.*

It measures just over 1 inch across the wings. The forewings are brownish yellow with a broad and somewhat diffuse transverse band near the outer margin and with fine irregular transverse brownish lines. The hindwings are pale brownish yellow with a broad blackish band near the outer margin.

The moth is in the pupal stage from seven to eight days.

Chloridea (*Heliothis*) *flavigera* Hamps. (Fig. 8).

Seed pods and leaves are attacked by this species. A certain amount of colour variation is met with in the caterpillar, which may be dark green, paler green with rows of black spots along the sides, or it may be brown.

Each type of caterpillar has longitudinal stripes of darker colour than the rest of the body.

A light cocoon is constructed in the soil by the caterpillar when about to pupate. Roughly ten days elapse before the emergence of the adult.

As previously stated the adult moth is very similar in colouration to *H. assulta.*

This species appears to feed exclusively on tobacco.

Plusiæ chalcites Esp. (Fig. 14).

The caterpillar of this species feeds on the leaves, the edges of which it draws together by means of silk. It differs considerably from the caterpillar of the species previously referred to, in that the body increases in size towards the posterior end. In colour it is green with narrow longitudinal white stripes along the back.

Cotton, maize, tomato, certain leguminous plants, cucumber, cabbage, potato and turnip are attacked by this species.

Pupation takes place among the folded leaves, and the pupal stage lasts about ten days.

The adult moth is a handsome insect having large brassy patches and two ovate silvery spots on the forewings. The hindwings are of a dull smoky colour.

Plusia signata F. (Fig. 13).

Large holes are made in the leaves by the caterpillar of this species when feeding. When full grown, it measures about one inch in length. It is green with a darker green stripe along the back. The head is yellowsh green. A few short hairs are present on the head and body.

Besides tobacco, it has also been recorded as feeding on onion.

To some extent, the adult of this species resembles the adult of *P. chalcites*, but it is much smaller, and the metallic areas on the forewings are dull and less extensive. It measures about one inch across the forewings.

Phthorimaea heliopa Low. (Fig. 4).

This species deposits its eggs singly on the leaf, frequently at the sides of the midrib and cross veins. They are dark buff in colour and are extremely small.

Soon after emergence from the egg, the caterpillar bores into the tissue of a tobacco leaf frequently near the place where the egg was laid. If the egg was laid on a stem, that part of the plant is bored.

Sometimes, when boring the leaf tissue the larva makes holes in it, in which case it usually leaves the tissue and makes a fresh tunnel in a leaf vein.

When full grown, the larva is about a quarter of an inch in length and is whitish in colour with a shining black head. It spins a light cocoon of silk close to the entrance of the tunnel previously gnawed by it in the stem, in which to pupate. This species is almost exclusively a tobacco feeder.

The chrysalis is somewhat slender, and is light brown. It measures a quarter of an inch in length.

The holes made in the leaf base or in the stem, although small, are conspicuous, since, shortly after having been made the edge turns black, and the surrounding area becomes brown.

The injury inflicted by the caterpillar usually gives rise to a gall-like formation on the plant.

The adult is the smallest of the species under consideration. It measures about half an inch across the forewings which are light brown. The hindwings are smoky and have a very broad fringe.

Psara submarginalis Swinh. (Figs. 1, 2, 3).

Owing to the habit of the caterpillar of this species eating away the upper and lower epidermis of a leaf, it may reasonably be called a "leaf skeletoniser".

The egg is small, rather soft and yellow.

The caterpillar is greenish with a shining black head on which is a pale yellow stripe. When full grown the colour of its body changes to pale yellow.

Lettuce, cabbage and jerusalem artichoke have also been recorded as foodplants.

Pupation takes place among the folded leaves which the caterpillar has drawn together with silk, and the pupal stage lasts seven days.

The adult moth measures about three fifths of an inch across. It is pale yellow with irregular greyish purple spots and lines, and with a broad purplish grey area along the front and outer margins of the forewings, and on the outer margin of the hind wings.

Lamprosema diemenalis Guen. (Figs. 5, 7).

Another species, the caterpillars of which feed on the shoots and leaves which they draw together with a silken web. The colour of the caterpillar is grey above and green below, and the head is yellowish.

It pupates among the folded leaves, and the pupal period is from six to eight days.

The moth is brown with irregular yellow markings, and measures three quarters of an inch across.

Several species of cover crops are eaten by the caterpillar.

Control of Tobacco Pests.

Both the Orthoptera and Hemiptera referred to are best controlled by capturing with a handnet or with the hand and then destroyed.

Cutworms may be effectively controlled by poison baits and by hand collecting. The bait for use against them consists of Paris green and bran mixed in the proportions of 1 lb. of the former to 50 lbs. of the latter. It should be prepared with just sufficient water to moisten it, and it should be broadcast at the rate of 10 lbs., dry weight, to the acre.

In preparing the poison bait, the bran and Paris green should be thoroughly mixed dry in a barrel or other receptacle, and then water should be added gradually until the whole is moistened.

The distribution of the bait should be done in the evening a day or two before planting out.

In the event of an outbreak of cutworms some days after planting, the same bait may be used, but it should be scattered around each plant.

Poultry and domestic stock should be prevented from feeding over an area where bait has been distributed.

Cutworms feed almost exclusively at night, and in the day-time, hide themselves among the soil or humus at the base of the plants on which they are feeding, or among herbage in the vicinity.

Hand-collecting should be, therefore, carried out after dark, when the cutworms have left their hiding places in order to feed.

A useful protective device against these insects, which is also recommended, is the use of small tins, (such as cigarettes are usually packed in) from which the bottoms have been removed, in which the plants should be placed, when they are planted out.

As an added protection, poison bait may be placed around the outsides of the tins.

Against leaf-feeders, a stomach poison must be used. This should be applied to the plants in the form of a spray, the poison recommended being lead arsenate.

The proportion of lead arsenate to water to make this spray is 1 lb. to 50 gals., if powder is used, or 1½ to 2 lbs., if paste is used. A stronger mixture is liable to scorch the leaves.

Dusting with this chemical in its powder form is also a useful method of control. For this process the lead arsenate powder is mixed with an equal quantity of dry wood ashes, and then spread over the plants by means of a duster, care being taken that the distribution is even.

Alternatively tapioca flour or slaked lime may be used instead of wood ashes.

The materials should be mixed in the proportions of 4 lbs. of lead arsenate powder to 4 lbs. of wood ashes, and the total quantity spread over 1 acre.

A stomach poison should also be used against the caterpillars of those species which feed in the buds, and, as a supplementary remedy, bran or fine meal mixed with lead arsenate and dropped into the centre of the buds, preferably after rain, is recommended.

The proportions in which this bait is mixed are 1 lb. of lead arsenate powder to 75 lbs. of meal.

In order to prevent infestation by pests when the tobacco is in the nursery, the beds should be covered with muslin at night.

When planting out is complete and no further use is going to be made of any plants which remain in the nursery, they should be destroyed by burning or by burying deeply in the soil.

After harvest, tobacco stalks should be cut down and destroyed to prevent their being foci of further infestation.

The stem borer *Phthorimea heliopa* is possibly the most difficult to control. The caterpillar, however, sometimes bores into the leaf tissue, in which it makes holes, and then makes a fresh tunnel in a leaf vein. In so doing it exposes itself to control by spraying or dusting with lead arsenate, since it is obliged to consume part of the external surface of a vein in order to re-enter it.

A more drastic method of dealing with this stem borer, is to slit the stem with a clean sharp knife and then to remove and destroy the caterpillar living therein.

For the control of ants in seedbeds, suggestions have been put forward that the beds be isolated by means of trenches or trays filled with water or kerosene. This method does not appear to be practicable.

It is desirable to search for the nests of ants, and when found, to destroy the inhabitants by pouring in boiling water or a disinfectant.

Mixing the seed with powdered naphthaline when sowing is effective in repelling ants.

The use of kerosene in the form of an emulsion for spraying the seedbeds, or for mixing alone with the soil when the seedbeds are being prepared, is recommended as an alternative measure.

The latter method consists of mixing with kerosene sufficient soil to cover the seedbed to a depth of an inch or so, then spreading on top of this, the soil in which the seeds are to be sown. The soil after mixing with kerosene should be more or less friable.

Another method which is effective as a trap for ants is to place around the seedbeds, portions of candle nut which has a strong attraction for these insects. Each day the portions of nut should be drenched with boiling water to destroy the ants on them. This is quite a cheap method, and need be employed only up to the time when seeds have started to germinate, at which stage, ants are no longer troublesome.

I am indebted to a local gentleman who has had considerable experience in tobacco planting, for this information.

Natural Enemies.

Natural enemies of the species described herein, either parasites or predators, have not frequently come under notice.

The Reduviid bug, *Cosmolestes picticeps* Sta. (Fig. 21) has been recorded as attacking caterpillars of *Chloridea flavigera,* and of *Psara submarginalis.*

This bug is a moderately large and conspicuous insect, and is frequently to be seen on the wing. In colour it is yellow with a good deal of black on the head and legs. When flying it appears to be entirely yellow.

The caterpillars of *Prodenia litura* are parasitised by a Braconid—*Chelonus* sp.,—(Fig. 22) and by the Tachinid fly—*Podomyia setosa* Dol., (Fig. 23), and the caterpillars of *Lamprosema diemenalis* by the Braconid—*Apanteles inquisitor* Wilk. (Fig. 6).

Podomyia setosa is a fly of the "blow fly" type, and is entirely grey with darker grey markings. The eyes are red.

Chelonus sp. and *Apanteles inquisitor* are inconspicuous insects and are hardly likely to be noticed in the field.

Review.

Oilseeds and Vegetable Oils.

Compiled in the Statistics and Intelligence Branch of the Empire Marketing Board September, 1932. 66 pp. H. M. Stationery Office, Kingsway, London, W.C. 2, price 6d. net (postage extra.)

This book is a summary of figures of production and trade relating to copra, groundnuts, cotton seed, linseed, olive oil, soya beans, sesame seed, rapeseed, palm kernels, palm oil and whale oil. We enumerate the products under consideration as we are informed that this list by no means exhausts the number of plants and seeds which yield oil upon a commercial scale. The inclusion of whale oil is justified as it competes with vegetable oils for various purposes.

As far as is practicable this publication treats each of these products under the following heads: area, world production, world export, importance of export trade, distribution of export, the British Empire as a unit, importing countries, United Kingdom imports and prices.

Two points of great importance emerge from a consideration of the facts stated in this book. Firstly, the very great importance of China as a producer of a number of oil-bearing products. The position regarding oil seed production is somewhat obscured by the absence of reliable data from this principal producer.

The second point is the fact that in most cases, the producing country is the most important consuming country. For instance, we are reminded that "United States, India and China export only a very small proportion of their cotton seed, India and China export respectively about 23 per cent. and 6 per cent. of their groundnuts; while China's exports of soya beans, including oil, represent no more than 21 per cent. of the estimated total production." ..... "The world's exports of palm oil represent less than 25 per cent. of total production and estimates of domestic consumption of coconut oil indicate that only about 60 per cent. of the world's coconuts are exported from producing countries in the form of copra and coconut oil."

It is perhaps but natural that the country of production should have found a number of local uses for an oil obtained locally. An interesting feature of such local consumption, however, is that in many cases the use to which producing countries put their oil is dissimilar to the uses found for it in importing countries. As evidence of this may be instanced palm oil in Africa which is used locally for culinary purposes, coconut oil in India and other countries of production, used largely as a lubricant as well as for culinary purposes and as a illuminant.

The large number of oils available in quantity and the fact that for many commercial purposes they are interchangeable, has resulted in the trend of prices of any one oil being influenced by the quantities and prices of other oils. Producers cannot afford, therefore, to consider their product as standing in a

class by itself, but must study its relation to other oils with which it competes. The publication before us, being a concise statement of production and prices, is a valuable basis from which to study the future prospects of any particular vegetable oil.

D. H. G.

Examination of Latex Samples by the Rubber Research Institute of Malaya.

The attention of managers of rubber estates is invited to a decision of the Board of the Rubber Research Institute of Malaya that as from the 1st February, 1933, fees as under will be charged:

for the determination of D.R.C. of latex $5/- per sample

for the determination of NH_3 content of latex $5/- per sample.

Managers will no doubt welcome an explanation of this action by the Board. The operations involved in the determination of D.R.C. and NH_3 have been fully described in Information Cards nos. 18c, 19c and 23c issued by the Institute and also in Section H of Planting Manual no. 4. Moreover, the officers of the Chemical Division have offered and are still willing to give personal tution to any planter who wishes to be instructed in the technique.

The operations can be easily learned and it is hoped that managers will, by undertaking their own analyses, relieve the officers of the Institute. With this end in view it has been decided to examine free of charge all latex samples sent by an estate during an initial period of one month, after which the fees stated above will be charged.

A. SHARPLES,

Acting Director Rubber Research Institute, Malaya.

Abstract.

THE USE OF DERRIS IN THE CONTROL OF WARBLE FLIES.*

The work was undertaken to ascertain whether the treatment of cattle over a large area to destroy all the warble larvae in the backs of the animals would be effective in eradicating the warble flies.

Investigtions in America and the United Kingdom on the most effective method of destroying the warble fly larvae in the backs of cattle have shown that a derris powder wash composed of 1 lb. derris powder, ¼ lb. soft soap, 1 gallon of water gives the most satisfactory results.

The results of systematic treatment in four demonstration areas are given. In the first, in North Wales, it was found that 91.9 per cent. of the cattle were infested, with an average of 14.2 warbles per animal. The result of one year's treatment with derris wash was to reduce the warbles to an average of 2.2 per animal with only half the animals infested. In the following year (1931), after again dressing all animals with the derris wash, the warbles per animal were reduced to 0.77, while only 22.8 per cent. of the animals were infested.

The second demonstration was designed to test whether an inland valley could be cleared of warble flies without re-infestation from farms on the other side of the mountains or hills. The satisfactory result was to reduce infestation from 79.3 per cent. of the cattle with 11.7 warbles per animal in 1931 to 15 per cent. of the cattle with an average of 0.72 warbles per animal in 1932.

Somewhat similar satisfactory results were obtained in the other two demonstration areas; the third area being an upland plateau and the other a lowland district.

From these results and the knowledge gained of the habits of the warble fly "it would appear that many farmers, owing to the topological situation of the farms, can be obtain a considerable reduction in the infestation of warbles on their cattle, even if they alone are treating their cattle. In other instances, small groups of farmers who occupy the farms on an inland valley or an upland plateau, or similar area of land, with natural boundaries, can by co-operative effort obtain very appreciable results. In low-lying flat districts, the area to be treated would have to be correspondingly larger if significient results are to be obtained, but even here, since the warble fly apparently does not travel any considerable distance, the united effort of a few farmers owning large farms would considerably reduce the warble fly population of the district".

For the treating of a few animals, perhaps purchased after the herd had been treated, the use of a derris wash might appear troublesome. It was found,

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* Abstract of "Extensive work on the Control of Warble Flies" by W. M. Davies and E. Jones, published in the Journal of the Ministry of Agriculture, Vol. XXXIX, No. 9, December, 1932.

however, that dry derris powder rubbed into the backs of animals was nearly as effective as the use of a wash. The value of dry powder for the destruction of lice on cattle enhances this method of application.

In order to ascertain if an appreciable reduction in the cost of treatment could be effected, another tropical plant, cuba root, was tested in a strength which would make its cost comparable with the use of derris. At this strength, although over 95 per cent. kill was obtained under special treatment, variable results were obtained under ordinary farm treatment. Cuba root, in the critical tests, proved just as effective as derris powder when applied at the same strength. At this strength, however, there would be no reduction in the cost.

The above abstract provides a valuable proof of the effectiveness of derris root in the eradication of warble flies in cattle. Derris is a product of Malaya, and is not, as many suppose, collected from our forests. It is cultivated on estates where every care is taken to ensure that only varieties with a high toxicity are grown.

Work on this subject has engaged the attention of the Department of Agriculture, S.S. & F.M.S. for some time, with the result that greater knowledge is accumulating regarding the toxic content of varieties. A disturbing factor, however, is that the toxic content varies not only in different varieties, but also according to the district in which it is grown. The increasing knowledge which is accumulating in this country of origin of the toxicity of derris root is resulting in a constant improvement in the quality of the root exported, a fact that should not be overlooked by investigation in other countries.—Ed. M.A.J.

ERRATUM.

Bleaching of Palm Oil.

In line 22 of the above named article on page 30 of the January 1933 issue of this journal, for "refined" read "required".

Miscellaneous Article.

THE GIANT SNAIL (*ACHATINA FULICA* FER.) IN MALAYA.

A comprehensive account on the Giant snail in Malaya appeared in 1926* and in that article it was stated that "at present, therefore, the snails are of little actual importance" and that "neither the damage done by the Giant snail nor its numbers have, up to the present, justified the cost of any extensive and organised control measures". The position to-day is similar to that of six years ago with the exception that the snail has been reported from other areas, that in 1931 on one estate damage to young rubber and to cover crops was reported and that the writer observed on one occasion slight injury to a few coffee berries. Even in some gardens where the snail is prevalent, the damage to flowering plants and vegetables has not been extensive and the chief objection to the snail in gardens would appear to be more intimately associated with its presence rather than with the injury it inflicts to garden vegetation.

The Giant snail is seen on hibiscus, gardenia and other plants, but that is not evidence that the snail, if damage is seen, is the responsible agent. The writer has observed the snail feeding on dead hibiscus flowers and frequently the presence of dead hibiscus buds are attributed to its depredations, when, in fact, the cause of the trouble is a small caterpillar (*Sylepta derogata*) which feeds within the buds. Damage to the leaves of gardenia has been attributed to the feeding of this snail, when often the green coloured caterpillar of the hawk moth (*Cephonodes hylas* L.) is responsible. This snail sometimes eats the leaves of cannas, but more frequently night flying beetles are the principal offenders.

In the writer's own garden in Kuala Lumpur a very small snail with a conically shaped shell (*Opeas* sp.?) was a considerably greater pest to seedlings of flowering plants and of lettuces than the Giant snail and perhaps some of the injury to young plants in other gardens may be caused, not by the Giant snail, but by this small conically—shelled snail.

The Giant snail may and does feed on vegetables and young flowering plants, but if regular collections are inaugurated and heaps of rubbish are not permitted to accumulate, little trouble will be experienced. The writer has seen lettuces growing in a garden adjoining Ampang Road, Kuala Lumpur, where snails are abundant and the only control measure which is practised is the collection of all snails in the morning and evening when they are moving either to or away from a bamboo hedge separating the garden from waste land.

There are at least in Kuala Lumpur three places with which the writer is acquainted where the snails are numerous, *viz*:—near the Golf Course, the Exhibition Ground of the Malayan Agri-Horticultural Association and the

* South, F. W., *Malayan Agricultural Journal*, Vol. 14, No. 7, July, 1926.

Federated Malay States Railway's Goods Yard. The proximity of the town refuse dumping ground is undoubtedly responsible for the prevalence of the Giant snail on the golf course, the introduction of plants and vegetables for exhibition purposes for their numbers near the Exhibition ground and the continuous transport of plants with the Giant snails and eggs from other infested areas in Malaya, for their abundance near the Railway Goods Yard.

It is not generally realised that enthusiastic gardeners in sending plants from an infested to a non-infested area are largely responsible for the gradual distribution of this snail throughout Malaya. In those areas, where this snail is absent, every precaution should be taken to examine all imported plants with soil, wrappers or similar material, for this snail and its eggs.

The introduction of parasites of the Giant snail was considered by this Department and with this end in view, enquiries were sent to Kenya, Uganda and Tanganyika—the supposed home of the Giant snail. In Kenya, the snail occurs in the coastal regions and for some distance inland but there are no records of damage to plants and no natural check is known. In Uganda it is doubtful if this mollusc occurs and if it does, it is certainly not a pest. In Tanganyika, the meteorological factor, *viz* :—the pronounced dry season, is considered to be the greatest controlling factor. *Achatina* occurs there but solitarily and may be harassed by birds and snakes. It will be seen by the above that very little information was obtained as to the natural enemies in these countries, and, in view of these replies, the contemplated introduction of parasites has not advanced beyond the enquiry stage.

It is not the purport of this note to give a detailed statement as to the habits and control of this insect since an article has already appeared in this Journal. The following is a summary of that paper :—

The eggs which are round and yellow with a hard shell and about the size of a pea are laid in sheltered places, the most favoured being refuse and manure heaps. They may be found in the months of June and July and September and October. The snail is for the most part a scavenger feeding almost exclusively on decaying vegetable and animal matter. It is active during the night and generally hides during the day in sheltered places under hedges, trees and rubbish heaps. Since vegetable accumulations, such as, heaps of grass cuttings, and manure and refuse heaps form ideal breeding and hiding places, the first essential measure for the control of this snail is their complete removal. Cleanliness in and about the garden should be the consideration of all garden owners.

All snails large and small should be colletced. This procedure should not be limited to the day time, as, in the evening, snails become active and are more easily seen and readily collected. The snails may be crushed or dropped into boiling water or in a solution of copper sulphate—2 lbs. to 5 gallons of water. The receptacles containing the copper sulphate which can be used repeatedly should not be made of tin or iron.

If the above two recommendations, *viz* :—the disposal of rubbish and the

collections of snails, are regularly practised complaints of the abundance of snails in gardens would not be heard.

Copper sulphate is the chemical specific against snails, and may be used in a variety of ways to protect seedlings or vegetable plants. Shallow ditches filled with sawdust or sifted wood ash which has been immersed in a 10 per cent. solution of copper sulphate will afford temporary protection. Ropes similarly treated may be pegged around vegetable or flower beds. Beds of flowering plants or vegetables may also be protected by enclosing them with $\frac{1}{4}$ inch mesh wire netting about 18 inches high.

Powdered copper sulphate mixed with fine ashes or sawdust and sprinkled around small beds or at about 6 inches from the base of special plants or alternatively a small crystal of ~~technical~~ placed near each plant on the surface of the ground will be found effective.

Copper sulphate solution—1 lb. to 10 gallons of water—may also be sprinkled where the snails are numerous.

If gardeners and others were to cooperate in the removal of all breeding places and in the systematic collection of snails, *Achatina* would be greatly reduced in numbers and would not by any means cause as hitherto so much annoyance.

G. H. C.

CONDITIONS ON SMALL RUBBER HOLDINGS IN MALAYA.

Fourth Quarter, 1932.

Prepared by the Economics Branch of the Department of Agriculture, S.S. and F.M.S. in collaboration with the Field Branch of the Department of Agriculture.

Rainfall.

In October, the weather in most parts of the Peninsula was wet, with unusually heavy rain and some consequent flooding in Penang, northern Perak and Selangor. Rainfall increased generally throughout the country during November, heavy downpours resulting in floods occurred in Province Wellesley and Penang towards the end of the month. December, on the other hand, was an abnormally dry month, the rainfall returns, with the exception of those from Kuala Selangor and Johore Bahru, were considerably below the average for recent years.

Prices.

Table I included in this article, shows the range of prices among local dealers for small-holders' rubber over numerous centres throughout the country where various factors, such as transport and competition, necessarily affect the prices paid to the producer. The table includes the average monthly Singapore prices for standard sheet and the prices quoted at the end of the month by the large dealers for small-holders' rubber, for the purpose of comparison. All quotations are given in Straits dollars and cents for the price per picul *i.e.* 133⅓ lbs.

Tapping.

The exceptionally wet weather experienced in Penang and Province Wellesley, Perak and Selangor during November seriously interfered with the normal tapping operations. It is reported that in south Perak tapping was only possible on from six to nine days during the first half of the month. The work in connection with padi cultivation and harvesting in Krian and parts of Selangor, Malacca, Pahang, Penang and Province Wellesley the Negri Sembilan and Johore was also responsible for a decrease in tapping operations in certain areas of those States. Reports state that in Selangor, Malacca and central Perak tapping was carried out with increasing rigour towards the end of the quarter in order to make up for the enforced periods of comparative idleness.

There has been an increase in areas tapped in Singapore owing to the approach of the Chinese New Year and in Johore after the end of the fruit season in the previous quarter. The practice of tapping the maximum number of trees possible has become general on the majority of holdings in Malacca.

Table 1

Rubber Prices (in dollars per picul i.e. 133⅓ lbs.)

4th Quarter 1932.

	Singapore standard sheet Average	Singapore for small holder's rubber at end of month	Penang for small holder's rubber	Kedah	Province Wellesley	Perak	Selangor	Negri Sembilan	Malacca	Pahang	Johore
					OCTOBER						
Smoked sheet.	9.96	9.30	—	8.50 to 11.50	8.50 to 11	6 to 11	7 to 9.25	7 to 10.50	8 to 9.50	8 to 11.50	6 to 10.50
Unsmoked sheet.		8.15	8 to 10	7 to 8.50	6 to 9.50	5 to 9	5 to 8	6 to 9	7 to 8	7 to 10.50	5 to 9
Scrap		3	—	3 to 4.50	1.50 to 4.50	1 to 4.50	1 to 4.50	1.50 to 6	2 to 5	1.75 to 4	1 to 4.85
					NOVEMBER						
Smoked shee	10.33	9.60	—	8.50 to 9.25	7.50 to 9.90	8 to 10.50	7 to 10	7 to 11.50	7 to 9.50	8 to 10	6.50 to 9.70
Unsmoked sheet		8.50	8 to 10	7 to 8.40	6 to 8.40	5 to 8	5 to 7.50	6.25 to 9	6 to 9	6.50 to 9.00	5 to 9.20
Scrap		3.50	4 to 4.50	3 to 4.50	2 to 4.20	1 to 3.80	2 50 to 4	1.50 to 6	2 to 5	1 to 4	1 to 4.50
					DECEMBER						
Smoked sheet.	10.05	9.60	—	8 to 10	6.70 to 10	6.50 to 9	6 to 9.25	7 to 9.25	8 to 9	6. to 9.20	9 to 9.40
Unsmoked sheet.		8.70	7.50 to 7.70	6.50 to 9	5.50 to 8	5 to 7	5 to 7.50	5 to 8.00	7 to 8	5 to 8	4.75 to 8
Scrap		4.20	3.50	2.60 to 3.60	2 to 4	1 to 4.50	2 to 3.75	1.50 to 4	1.50 to 4	1 to 4	1 to 3.80

Report from the Negri Sembilan states, on the other hand, that among the Chinese-owned holdings there is a noticeable tendency towards selective tapping, the more unproductive trees being left to rest.

Bark Consumption Investigations. The records of consumption and reserves of bark, yields and rates of bark renewal have been completed on 74 out of the total 90 holdings under observation, the resulting figures are now in the course of compilation. Monthly measurements are still being taken on a further 13 holdings, on 11 of which tapping had been suspended for varying periods during the past year. Observations will not be completed on some of these holdings until April next. Four holdings have been put out of tapping until such time as there is a material improvement in the rubber market, so that it will be impossible to obtain 12 monthly records from these areas.

Postponement or acceleration of bringing young rubber into tapping. It is stated that in some parts of the Negri Sembilan there is a tendency to postpone the tapping of young rubber owing to the unremunerative yields of the trees. As mentioned in the report on the preceding quarter, this also applies to the State of Johore.

Areas out of tapping on Small Holdings.

Accurate figures of areas of tappable rubber which are out of tapping on estates of 100 acres and over are received and published monthly, but hitherto, with sole exception of the Negri Sembilan, where the Agricultural Field Officer has obtained monthly figures from the Malay headmen relating to Malay-owned holdings of approximately ten acres and under, no information has been received concerning the tappable areas which are untapped on small holdings.

Attempts were made in one district in Selangor at inaugurating the compilation of similar figures by Malay headmen, but were finally abandoned owing to the length of time taken in their collection and to the very obvious inaccuracy of such results as were obtained.

It was thought that a series of observations among the numerous road-side holdings would indicate, approximately, the proportion of the total number which were untapped, consequently a number of counts were taken of the holdings both tapped and untapped, at various times, along the sides of the main roads in the Negri Sembilan, Selangor, Pahang, Perak and Malacca.

This series of observations was started experimentally in June, 1932, when it was found that figures thus obtained in the Negri Sembilan approximated reasonably closely with those furnished by the Malay headmen, when due allowance was made for the holdings owned by Chinese and Tamils which were not included in their estimates.

This system of counting road-side holdings was begun on a small scale in Malacca, the Negri Sembilan and Selangor over approximately 100 miles of main road. The area was extended in July and August to cover 132 miles of road in the Negri Sembilan, 186 miles in Selangor and 48 miles in Pahang; in

September observations were also made over approximately 225 miles of road in Perak.

Since it was considered that the figures obtained by this method had proved themselves of considerable value in estimating the total area untapped amongst small holdings, in October the Agricultural Field Officers in the Federated Malay States were asked to continue to take observations in their States on the above lines, with the result that during October, November and December figures were obtained from a total of 6,833 holdings in the more important areas of small rubber holdings covering a total distance of 777 miles of road. Further observations were made on 322 holdings over 72 miles of road in Malacca territory during November and December.

In order to compute the acreage of tappable rubber (1926 planting and earlier) which was out of tapping, the figure showing the percentage number of holdings untapped along the road-sides in each District was applied to the known total area of holdings under 100 acres in that District. Table II shows the areas untapped in each District during the month of December, 1932, as calculated from the foregoing system of observation. The figures for the preceding months are too inadequate for the purpose of inclusion in this table.

Prior to the organised observations made by Agricultural Field Officers in October, counts had only been taken by two officers of the Department in the course of their routine travelling. It is of interest to note, however, that from the figures collected in the Federated Malay States, during the period of July to December, 1932, an average of 16 per cent., or 82,000 acres, of the total tappable area of 511,000 acres, are shown to have been untapped.

In the case of the three Districts marked with an asterisk in table II the few holdings situated on the road-sides had not been accepted as being indicative of the majority in these areas, therefore the estimated area only has been included.

Figures for areas out of tapping in Malacca are not included in table II on account of the fact that in the Central District no record is available as to areas of small holdings planted yearly, only the total area at the end of 1931, *viz.* 17,732 acres being known. It is therefore impossible to show the total area of tappable rubber for this District.

In Alor Gajah District during December 2,399 acres or 8 per cent. of the tappable area was out of tapping and in Jassin District 2,738 acres or 11.5 per cent.

The figures throughout the period have shown considerable fluctuations in each locality and in each month. During the period of August-September, when rubber prices reached their highest for the latter half of the year, there was generally a corresponding increase in the area tapped over that of the preceding months, but with this exception, there was no apparent relationship between market prices and areas untapped.

In Districts where there are large areas of padi there was, in some cases, a perceptable increase in the amount of rubber untapped at such times as the

labour was absorbed by work in the padi fields, but this factor was not sufficiently great to show a definite correlation between the fluctuations of the total areas out of tapping and work in connection with padi cultivation in any of the Federated Malay States. This is probably owing to the fact that the more important padi growing districts are not usually large rubber producing districts. It would, therefore, appear impossible to ascribe the variations in untapped areas from month to month to any one particular cause.

Diseases.

Mouldy rot.—Although no newly infected areas have been reported during the quarter, the advent of wet weather during November caused a correlative recrudescence of this disease in all previously infected areas throughout the Peninsula. As before, the impoverished condition of the small-holder has meant that the normal enforcement of the regulation treatment which entails the cessation of tapping during a period when three paintings with an approved disinfectant are carried out is almost impossible of achievement. Indeed, the most that can be done is to encourage as much painting as possible. In consideration of this, the amount of voluntary painting with disinfectants which has been observed in some localities is reasonably gratifying.

Pink disease.—No serious outbreaks of this disease have been observed; sporadic cases are reported from Muar in Johore, Kuala Muda, Baling and Kota Star in Kedah, Ulu Selangor and Kuala Lumpur, Ulu Ijok in Krian and Changhat Jong and Dajang in southern Perak.

Root diseases.—There is no noteworthy observation to be made under this heading for the current quarter.

Budgrafting.

Report from Johore states that a Japanese small-holder in Muar District has budgrafted 150 trees on his holdings during the quarter, furthermore, a few Chinese small holdings in the Segamat District are said to have been budgrafted.

Grades of Rubber Made.

The popularity of the sale of unsmoked sheet among small-holders is still maintained, with the sole exception of the coastal Districts of Selangor where its production, which was never very considerable, has now been discontinued. The figures for the comparative production of the three grades of rubber, where such have been recorded, are as follows:—Perak, (central Districts only) smoked sheet 35 per cent: unsmoked sheet, 45 per cent. and scrap 20 per cent. Malacca, smoked sheet 40 per cent., unsmoked sheet 36 per cent. and scrap 24 per cent.

It should be noted that unsmoked sheet is usually cured by the local dealers who deduct the cost of this from their payments to the producer.

Table II.

Acreage of Tappable Rubber in the F.M.S. which was out of Tapping on Holdings of less than 100 Acres, during December 1932.

PERAK				SELANGOR				NEGRI SEMBILAN				PAHANG			
District	Total tappable area	Total area untapped	Percentage	District	Total tappable area	Total area untapped	Percentage	District	Total tappable area	Total area un-tapped	Percentage	District	Total tappable area	Total area untapped	Percentage
Batang Padang	36,015	1,369	3.8	Klang	18,449	7,416	40.2	Seremban	18,834	5,217	27.7	Raub	6,583	1,007	15.3
Kinta	33,886	2,202	6.5	Kuala Langat	29,108	3 493	12.0	Tampin	17,391	2,434	14.0	Kuala Lipis	15,147	5,529	36.5
Kuala Kangsar	42,665	4,266	10.0	Ulu Langat	38,425	3,458	9.0	Kuala Pilah	17,253	6,556	38.0	Bentong	13,005	1,561	12.0
Upper Perak	12,378	2,772	22.4	Ulu Selangor	29,272	4,098	14.0	Jelebu	6,248	375	6.3	Other Districts	29,498	6,784†	23.0†
Larut & Selama	50,474	5,451	10.8	Kuala Lumpur	21,062	4,800†	16.0†	Port Dickson	9,995	3,998	40.0				
Krian	9,598	1,248	13.0	Kuala Selangor	8,870										
Lower Perak	46,412	4,641*	10.0*												
	231,428	21,949	9.5		145,186	23,265	16.0		69,721	18,580	26.6		64,233	14,881	23.17

Total area of tappable rubber on small holdings in F.M.S. = 511,000 acres.
" " " " " " untapped in December 1932 = 79,000 acres, i.e. 15.5 per cent.

* Estimated from same percentage as shown in Kuala Kangsar District.

† Estimated from average percentage for remainder of State.

It is interesting to note that the Negri Sembilan in December, work was being carried out in the padi fields in both Seremban and Kuala Pilah, two of the Districts which show higher percentages of holdings untapped. In Pahang, padi harvesting was general during the month. The high percentages untapped in the Klang District of Selangor and in the Port Dickson District of the Negri Sembilan have been more or less constant throughout the period of observation probably owing, more particularly in Klang, to the poor growth of the trees and the uneconomic yields obtained.

Slab rubber is sold, in moderate quantities only, in the Larut, Krian and Selama Districts of Perak, where its prices per picul have ranged from $2.75—$5 in October, $2—$4 in November and $2.50—$5 in December.

Tendency to Abandon Rubber Cultivation for Alternatives.

During each month of the period under review reports from Singapore have stated that considerable areas of old rubber are being cut out and other crops, principally fruit trees, are being substituted. Owing to the fact that the majority of small holdings on the island have been untapped for a considerable period, this destruction of rubber will probably have no immediately perceptible effect on the total rubber production from the small holdings in Singapore.

From general observations elsewhere it may be definitely stated that there are no signs of a popular tendency to destroy rubber trees for the planting of other crops. Indeed, in Selangor, where previously some such activities on a small scale had been reported, there has been no further instance of this, as it would appear that sufficient land has now been cleared to enable owners to plant small areas of food crops for their own consumption.

A few isolated instances of the cutting out of a small number of trees has, however, been observed in the Negri Sembilan and the central Districts of Perak.

General Upkeep of Holdings.

On the majority of holdings of a small area, very little attention is paid to general sanitation. On many of the older planted holdings the growth of weeds is kept in some check by the dense shade caused by the close planting of the trees or by sporadic efforts to reduce it on the part of the owner. Many small holdings of more recent planting are very heavily overgrown with weeds bush and "lallang" grass and little attempt is made to do more than to clear narrow avenues in which the tapper may walk from tree to tree.

The complete abandonment of rubber is rare except in cases where, owing to swampy or very barren soil the trees are unproductive.

Among holdings of a larger area, *i.e.* of approximately twenty acres and over, the majority of which are Chinese or Tamil owned, some system of weeding is generally practised.

Departmental.

FROM THE DISTRICTS.

January, 1933.

The Weather.

Generally speaking, January is a moderately wet month in most parts of the Peninsula, although rainfall is normally below that of December. Exceptions are the northwest coast, namely that of Kedah and Province Wellesley and the coast of Malacca and Negri Sembilan where January weather is considerably drier than in the remainder of the country. This year, as a result of the abnormally dry December, January's rainfall is in many cases above that of the previous month, although approximately average for most of the country. Exceptions are the main range running through Perak and the east coast of Pahang where the rainfall was above the average. This also applies to the strip of Perak-Selangor coast from Parit Buntar southward to Klang.

Remarks on Crops.

Rubber.—The local range of prices for kampong rubber shows a still further slight fall as compared with last month's figures, the range per picul being from \$5.30—\$9.30 for smoked sheet, \$3.00—\$8.00 for unsmoked sheet and \$1.00—\$4.50 for scrap. In these figures two abnormal price quotations have been omitted, namely \$4.00 as the lowest price for smoked sheet at Ulu Langat and \$1.50 as the lowest price for unsmoked wet sheet at Batu Kurau in north Perak. The corresponding average prices in Singapore for kampong rubber were \$8.00 for smoked sheet, \$7.00 for unsmoked sheet and \$3.20 for scrap.

As usual, accelerated tapping took place in small holdings in most areas by Chinese and Malays in an endeavour to realise extra cash or credit for the celebration of the Chinese festival of New Year and the Malay festival of Hari Raya.

There is nothing fresh to report in the matter of disease or sanitation of small holdings.

Padi.—The price at the Bagan Serai Government Mill was \$1.62 per picul, a slight drop as compared with the price obtaining during the last few months. This is equivalent to about 6½ cents per gantang.

Harvesting of the crop was general during the month in Kedah, Province Wellesley, the Seremban and Tampin Districts of Negri Sembilan, the central mukims of Malacca and the Muar District of Johore. At the end of the month it was completed in the inland Districts of Selangor, the Jelebu District of Negri Sembilan, the inland mukims of Malacca and throughout west Pahang and the riverine mukims of east Pahang. The crop is reported to be generally good throughout the country. In Krian, harvesting has commenced sporadically

throughout the District. The crop in the eastern portion of the District, comprising the mukims of Bagan Serai, Briah, Selinsing and Gunong Semanggol, will be ready for harvest during next month and prospects are good. As previously reported, throughout the coastal and north parts of the District conditions are irregular and some of the late planted areas will not be ready for harvest until the end of March or beginning of April. Although the plants look very promising at the moment throughout this latter area, prospects cannot be considered as anything but doubtful in view of the anticipated lateness of harvest. A commencement has also been made in Upper Perak and harvesting is expected to be general throughout Kuala Kangsar and Larut Districts next month. It has also begun in the Kuala Pilah District of Negri Sembilan. In the Alor Gajah and Jasin coast mukims of Malacca the crop is somewhat late and is not yet ready for harvest. High winds accompanied by heavy showers have caused lodging of the crop in certain localities in Province Wellesley and Perak.

Further details regarding the increased areas planted in Pahang mentioned last month, indicate that the increase in area is confined to the Districts of Kula Lipis and Temerloh.

Coconuts and Copra.—The price of copra has fallen during the month, Singapore quotation being $4.85 per picul as compared with $5.10 for last month, whilst the Penang quotation has ranged between $4.00—$4.25 for this month as against $4.60 throughout last month.

This month's reports contain mention of continued steady progress in the matter of improvement in kiln construction and copra manufacture by smallholders. Thus in Province Wellesly the erection of further improved kilns has been commenced. On the other hand keen competition has forced the temporary suspension of production of copra on some Malay kilns in Penang.

In Selangor, a number of Malays gave up copra manufacture during the fasting month but it is interesting to note that all the improved kilns continued working regularly excepting for a few days before and after Hari Raya. Notwithstanding the drop in the price of copra the price of nuts has remained stationery. Consequently a number of Malays who had been manufacturing copra reverted to the sale of nuts instead. Signs of some progress, however, are not altogether wanting, as group manufacture is still extending in parts of of Kuala Selangor District and the copra turned out by such group manufactures has maintained at a high standard. Further progress towards improvement of kilns has been made during the month at Sabak. The practice, reported a few months ago, of the preparation of coconut oil for their own requirements by Malays still continues in Kuala Langat District and 24 gallons were sold at Banting at the last Village Fair of the month.

The price of nuts sold for eating increased temporarily during the month as a result of the demand in connection with the Chinese and Mohammedan Festivals.

Cloves.—It is noted that the price of $50.00 per picul for this product in Penang is maintained.

Tobacco.—During the month a little over 40 piculs of locally grown tobacco were sold at Penang and Bukit Mertajam, prices ranging between $10.00—$40.00 per picul of cured leaf according to quality. In south Perak, cultivation of the crop still receives attention and has replaced tuba on some areas. In the Baling District of Kedah 21 acres were planted during the month.

Arecanuts.—A few months ago the Krian report contained details regarding trial consignments of graded arecanuts sent by the Telok Medan Co-operative Society to the Penang market. The transaction resulted in an enhanced price for growers. It is reported that three further consignments were sent to Penang and some improvement in grading had been attained. Similar attempts at co-operative grading and sale are being made at Padang Rengas in Kuala Kangsar District, but further improvement is needed in the matter of preparing the product and grading it. Similar activities are reported as taking place in the Kundang and Batu Laut mukims of Kuala Langat, Selangor.

Agricultural Stations and Padi Test Plots.

Agricultural Stations.—Steady progress continued throughout the month at Bukit Mertajam Station and the whole of the low-lying area was sub-soil drained with 4 inch pipes. Further progress was made in stocking the Station at Temerloh, a number of fruit trees, arecanuts and bananas being planted during the month. At Tanah Rata, Cameron Highlands, improvements to the Tea Factory were completed.

Padi Stations and Test Plots.—Harvesting is in progress or about to commence at all Padi Stations and Test Plots in Kedah and Perak. At the Titi Serong Experiment Station some trouble was experienced in water control as the result of heavy rain on the 19th and the deep water caused the padi to lodge in places. Reaping is nearly completed at Rembau Test Plot in the Negri Sembilan and good progress with harvesting has been made throughout the month at Pulau Gadong Experiment Station in Malacca. At the Test Plots at Tangkak, Sungei Mati and Sungei Balang in Johore, harvesting was completed and the Pulau Gadong pedigree strains S.M. 29 and N. 66 gave very satisfactory yields.

DEPARTMENTAL NOTES.

Visits of the Director of Agriculture.

Dr. H. A. Tempany, C.B.E., in company with the Chief Field Officer and the Agriculturist, visited Cameron Highlands from January 17th to 20th with the object of inspecting the work at the Agricultural Experiment Station. A visit was paid to Kea Farm, the property of Mr. Drewitt, and discussions were held with leading residents of the Cameron Highlands on the work of the Department and on local agricultural policies as a whole.

On the 10th of January the Director of Agriculture visited Singapore to attend a meeting of the Executive Council for the purpose of discussing a bill relating to pineapple legislation.

On the 29th and 30th the Director of Agriculture visited Fraser's Hill and inspected the work at the Government Dairy Farm.

Film on the School of Agriculture, Malaya.

A film which was made by the Department of Agriculture to illustrate work at the School of Agriculture at Serdang, was shown at a meeting of the Advisory Committee of the School and later to the Chief Secretary to Government, the Hon'ble the British Resident of Selangor and the heads of Branches of the Department. Arrangements are being made for the display of this film in certain English schools in Selangor and it is intended that subsequently, this film should form a part of the cinematographic exhibits of the Rural Lecture Caravan.

Advisory Committee for the School of Agriculture.

A meeting of the Advisory Committee for the School of Agriculture, Malaya, was held on January 5th, among the other subjects on the agenda was the question of the institution of a scholarship scheme for the school.

Marketing of Peasant Produce.

Arrangements have been made for the establishment of a liaison committee between the Agricultural and Co-operative Departments and the Rubber Research Institute of Malaya, with the primary object of considering, and discussing problems in connection with the marketing of peasant produce. The Committee is an expansion of the Film Propaganda Committee and its formation is the direct outcome of proposals made at the Agricultural Conference held in Kuala Lumpur in August last.

Government Dairy Farm, Fraser's Hill.

A considerable amount of useful information has become available as a result of the past year's working of the Government Dairy, Poultry Farm and Gardens, at Fraser's Hill, Pahang. It is felt that the experience gained will

be of assistance to those who are either already undertaking or contemplating farming operations at high elevations in Malaya. An article reviewing the results to date of this undertaking of the Department is in course of preparation.

There has been a steady demand for fresh cream from visitors to the hill.

During the dry weather excellent results have been obtained with vegetable production, there being a sufficient supply for the requirements of the hill and a surplus which forms a ready sale in Kuala Lumpur.

New Title.

The title of the appointment of Assistant Agriculturist, Cameron Highlands of the Agricultural Department, S.S. & F.M.S. has been altered to Agricultural Field Officer, Cameron Highlands with effect from 1st January, 1933.

Leave.

Mr. J. L. Greig, Assistant Agriculturist, has been granted 8 months and 16 days leave on full pay with effect from 26th January 1933.

Dr. H. W. Jack, M.B.E., Economic Botanist, returned from leave of absence on 2nd February 1933.

Statistical.

MARKET PRICES.

January, 1933.

The Singapore Chamber of Commerce Market Report dated 28th January 1933 points out that the Produce markets were closed for the last three days of the week for Chinese and Malay holidays. Prior to these neither buyers nor sellers shewed any keenness to operate and very little business has been recorded in the following products:—copra, cloves, gums, mace, nutmegs, pepper, pineapples, sago flour.

Rubber.—The highest price recorded in Singapore during January for rubber smoked sheet, equal to London Standard was 7 1/16 cents per lb. on 7th. and the lowest price 6 5/16 cents on 31st. The average price for the month was 6.75 cents per lb. in Singapore, 2.28d. London and 3.01 cents gold New York; as compared with 7.54 cents, 2.48d., and 3.20 cents gold respectively in December 1932.

Palm Oil.—The course of the market during the month of January was as follows:—4th. £17 - 10; 11th. £17; 18th. £16 - 10; 26th. £16 - 10 on a basis of 18 per cent. f.f.a., c.i.f. Liverpool. During the first half of the month the market was reported quiet, while during the second half of the month the market was nominal.

Copra.—The decline in prices, noted in last month's report continued throughout January, the price of sundried at the beginning of the month being $5.45 per picul and falling to $4.75 by the end of the month. The average price of this grade in January was $5.16 per picul as compared with $5.72 in December, while the mixed quality which averaged $5.20 per picul in December, averaged $4.72 in January.

Copra cake was quoted throughout the month at $2.10 per picul.

Coffee.—The Singapore price of Sourabaya coffee fell by about $1.50 per picul during the month. The average price in January was $25.37 to $27.50 the price within this range depending upon quality. Palembang coffee dropped by 50 cents to $19.50, the average price in January being $19.75 per picul.

Arecanuts.—Palembangs remained steady at $2.75 per picul and Bila Whole averaged $2.69 as compared with $2.65 and $3 per picul respectively in December. Singapore average prices for other grades were:—Split $3.12 to $5.14, Red Whole $4 to $5, Sliced $5.75 to $7.49 per picul, the price within each range depending upon quality.

Rice.—The following are the average wholesale prices per picul of rice in Singapore during December: Siam No. 2 $3.65: Rangoon No. 1 $3.20 as compared with $3.79 and $3.41 respectively in November.

The average wholesale prices throughout the year 1932 were:—Siam No. 2 $3.97: Rangoon No. 1 $3.73, as compared with $4.05 and $3.74 (July - December only) for 1931.

The average retail market prices in cents per gantang of No. 2 Siam rice

in December were :—Singapore 28, Penang 30, Malacca 27, as compared with 30, 30 and 27 respectively in November.

The average retail prices throughout the year 1932, for No. 2 Siam rice were :—Singapore 30, Penang 34, Malacca 28, as compared with 32, 35 and 31 respectively for 1931.

Gambier.—Block gambier has remained steady throughout the month at $5 per picul, while Cube No. 1, which for the first three weeks of January stood at $9 per picul thereafter fell to $8, the average price for the month being $8.75 per picul. Average prices in December were Block $5.20, Cube No. 1 $9.80.

Pineapples.—Prices have remained practically unchanged throughout the month with a slight downward tendency at its close. Average Singapore prices per case in January were :—Cubes $3.20, Sliced flat, $2.97, Sliced tall $3.34 as compared with $3.07, $2.85 and $3.26 respectively in December.

Tapioca.—Flake appreciated by 40 cents per picul to $4.30 during the second half of the month, the average price per picul in January being $4.10 as compared with $3.70 in December. Pearl seed was quoted throughout January at $4.60 and Pearl medium at $4.75; average price per picul for these grades in December were $4.12 and $4.22 respectively.

Sago.—Pearl small fair was quoted at $3.90 throughout January, as compared with an average price of $3.98 in December. Flour, Sarawak, fair averaged $2.01 per picul in January as compared with $2.15 per picul in December.

Mace.—Prices more or less nominal, and quoted throughout the month at $62 per picul for Siouw and $40 per picul for Amboina. Similar prices ruled during the previous month.

Nutmegs.—Singapore prices were quoted throughout January at $25 per picul for 110's and $26.50 per picul for 80's. Corresponding prices in December were $25.20 and $30.60 per picul respectively.

Pepper.—Prices have further declined throughout the month. Singapore Black averaged $16.62 per picul, Singapore White $20.31 per picul and Muntok White $20.69 per picul as compared with $17.25, $21.65 and $22.15 respectively in December.

Cloves.—Market continues featureless, nominal prices being quoted at $40 per picul of Zanzibar and $45 per picul for Amboina.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm Oil reports are kindly supplied by Messrs. Cumberbatch & Co., Ltd., Kuala Lumpur, the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agriculture products. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W. 1.

GENERAL RICE SUMMARY.*

December, 1932

Malaya.—Gross foreign imports of rice (including stocks available for re-export) during December, 1932, amounted to 57,402 tons, as compared with 53,377 tons in December, 1931, of which 55 per cent. were consigned to Singapore, 19 per cent. to Penang, 8 per cent. to Malacca, 16 per cent. to the Federated Malay States and 2 per cent. to the Unfederated Malay States.

Of these imports, 62 per cent. were from Siam, 35 per cent. from Burma, 4 per cent. from Indo-China and 1 per cent. from other countries.

Total foreign exports of rice from Malaya in December, 1932, were 17,876 tons (including 131 tons local production) as compared with 17,515 tons in 1931.

Of these exports 85 per cent. were consigned to Netherlands India and 15 per cent. to other countries.

Net imports for the period January to December 1932 were 409,631 tons as compared with 516,832 tons during the same period for 1931, a fall of 20 per cent.

India and Burma.—Total foreign exports of rice during November, 1932, were 100,000 tons as compared with 72,000 tons in October, 1932, and 135,000 tons in November, 1931, an increase of 39 per cent. in respect of the previous month and a decrease of 26 per cent. in respect of the same period in the previous year.

Total exports during the period January to November, 1932, were 1,966,000 tons as compared with 1,941,000 tons for the corresponding period of 1931, an increase of 1 per cent.

Total exports of rice and bran from Burma during the period January 1st to November 30th, 1932, amounted to 3,993,090 tons, as compared with 4,914,044 tons for the corresponding period of 1931, a decrease of 19 per cent. Of these exports 917,314 tons went to India in 1932 as compared with 1,374,356 tons in 1931, a decrease of 33 per cent.

Japan.—No information received.

Formosa.—No information received.

Siam.—Exports (approximate) during December, 1932, amounted to 130,000 tons as compared with 114,000 tons in December, 1931, an increase of 14 per cent.

At the end of December, 1932, the area under padi in 60 Provinces amounted to 7,475,000 acres, an increase of 261,000 acres or 4 per cent. as compared with the same period of 1931. The area harvested to date was 943,000 acres yielding 509,000 tons, an increase in area of 53,000 acres or 6 per cent. and 67,270 tons or 15 per cent. over the yield figures for the corresponding period of 1931. The area damaged in estimated at 301,000 acres, a decrease of 429,000 acres or 59 per cent. from that of the previous year.

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*Abridged from the Rice Summary for December, 1932, compiled by the Department of Statistics, S.S. and F.M.S.

Netherlands India, Java and Madura.—For the period January to November, 1932, the area harvested amounted to 8,884,000 acres an increase of 420,000 acres or 5 per cent. as compared with the corresponding period of 1931 : the area damaged was 354,000 acres a decrease of 116,000 acres or 25 per cent. as compared with 1931, and additional plantings awaiting harvesting amounted to 1,794,000 acres a decrease of 59,000 acres or 3 per cent. The total acreage at the end of November, 1932, amounted to 11,032,000 acres, an increase of 245,000 acres or 2 per cent. as compared with the same period in 1931.

Imports of rice into Java and Madura during January to November, 1932, totalled 136,537 tons, a decrease of 127,096 tons or 48 per cent. as compared with the same period of 1931.

Imports of rice into the Outer Provinces during January to October, 1932, amounted to 219,689 tons, a decrease of 49,439 tons or 18 per cent. as compared with the same period of 1931.

French Indo-China.—Entries of padi at the port of Cholon from January 1st to December 31st, 1932, amounted to 1,113,000 (metric) tons, an increase of 15,000 tons or 1 per cent. as compared with the same period of 1931.

Exports of rice from Saigon for the period January to December, 1932, totalled 1,192,000 tons, an increase of 230,000 tons or 24 per cent. as compared with the corresponding period of 1931.

Ceylon.—Imports for the period January to November, 1932, totalled 399,467 tons, a decrease of 71 tons on the imports for the same period of 1931.

Of these imports 20 per cent. were from British India, 70 per cent. from Burma, 4 per cent. from the Straits Settlements and 9 per cent. from other countries.

Europe and America.—Quantities of rice shipped from the East were :—

(*a*) To Europe for the period January 1st to December 21st 1932, 1,010,000 tons, a fall of 31,000 tons or 3 per cent. as compared with the same period of 1931. Of these 1932 shipments 52 per cent. were from Burma, 2 per cent. from Japan, 38 per cent. from Saigon, 5 per cent. from Siam and 3 per cent. from Bengal, as compared with 57 per cent. from Burma, 7 per cent. from Japan, 28 per cent. from Saigon, 6 per cent. from Siam and 2 per cent. from Bengal in 1931.

(*b*) To the Levant, period January 1st to November 25th, 1932, 48,060 tons, a fall of 16,810 tons or 26 per cent. as compared with the same period of 1931.

(*c*) To America and the West Indies for the period January 1st to November 9th, 1932, 118,366 tons, a decrease of 27,633 tons or 19 per cent. as compared with the same period of 1931.

ACREAGE OF TAPPABLE RUBBER OUT OF TAPPING ON ESTATES OF 100 ACRES AND OVER, MALAYA, AT THE END OF DECEMBER, 1932.

State or Territory	Acreage of Tappable Rubber end 1931	Estates which have entirely ceased tapping		Estates which have partly ceased tapping		Total (3) + (5)	Percentage of (7) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Federated Malay States :—							
Perak	238,420	13,441	5.6	30,669	12.9	44,110	18.5
Selangor	294,030	17,981	6.1	36,632	12.5	54,613	18.6
Negri Sembilan	217,002	17,946	8.3	20,110	9.3	38,056	17.5
Pahang	35,122	8,309	23.7	4,278	12.2	12,587	35.8
Total F.M.S. ...	784,574	57,677	7.4	91,689	11.7	149,366	19.0
Straits Settlements :—							
Province Wellesley	44,055	2,019	4.6	8,726	19.8	10,745	24.4
Dindings	6,700	310	4.6	1,005	15.0	1,315	19.6
Malacca	110,288	5,451	4.9	21,360	19.4	26,811	24.3
Penang Island	1,585	1,058	66.8	59	3.7	1,117	70.5
Singapore Island	28,033	12,752	45.5	4,068	14.5	16,820	60.0
Total S.S. ...	190,661	21,590	11.3	35,218	18.5	56,808	29.8
Unfederated Malay States :—							
Johore	313,385	41,266	13.2	35,426	11.3	76,692	24.5
Kedah (*a*) (*c*)	114,254	11,114	9.7	7,112	6.2	18,226	16.0
Kelantan	16,785	9,695	57.8	1,350	8.0	11,045	65.8
Trengganu (*b*)	4,300	Nil	Nil	2,120	49.3	2,120	49.3
Perlis (*c*)	903	106	11.7	462	51.2	568	62.9
Total U.M.S. ...	449,627	62,181	13.8	46,470	10.3	108,651	24.2
Total Malaya ...	1,424,862	141,448	9.9	173,377	12.2	314,825	22.1

Notes :—1. (*a*) Registered companies only and are rendered quarterly, commencing with June 1931.
(*b*) Registered Companies only.
(*c*) The above figures quoted for Kedah and Perlis are those for September, revised figures will be published when available.

The above table together with a Summary was prepared and published by the Statistics Department, S.S. and F.M.S. in January 1933.

ACREAGE OF TAPPABLE RUBBER OUT OF TAPPING IN NETHERLANDS INDIA AT END OF NOVEMBER, 1932.

	A Totally Ceased		B Partly Ceased		Total A & B	
	Estates	Area in Acres	Estates	Area in Acres	Estates	Area in Acres
Java and Madura ...	167	87,932	58	14,355	225	102,287
Outer Provinces ...	201	84,555	66	32,797	267	117,352
Netherlands India ...	368	172,487	124	47,152	492	219,639

MALAYAN AGRICULTURAL EXPORTS, DECEMBER, 1932.

PRODUCT.	NET EXPORT IN TONS.			
	Dec. 1931	Dec. 1932	Year 1931	Year 1932
Arecanuts ...	1,740	1,731	19,266	20,280
Coconuts fresh ...	1,900	829‡	10,468	7,723†
Coconut oil ...	874	1,281	9,909	11,932
Copra ...	9,810	6,768	100,809	97,464
Gambier, all kinds ...	164	172	2,563	1,925
Palm kernels ...	82	150	726	1,248
Palm oil ...	649	592	4,574	7,892
Pineapples Canned ...	7,170	6,231	59,457	66,291
Rubber § ...	39,837	40,974	434,857	417,137
Sago—flour ...	1,527	974	5,608	10,267
„ —pearl ...	216	176	2,429	3,228
„ raw ...	140*	315*	2,904*	4,148*
Tapioca—flake ...	813	682	9,742	9,028
„ —flour ...	119*	284	491*	392
„ —pearl ...	1,876	1,409	19,006	19,977
Tuba root ...	6	39½	74	165½

‡ 1,161,000 in number. † 10,812,300 in number. * net imports. § Production.

MALAYA RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF DECEMBER, 1932 IN DRY TONS.

Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
								during the month		during the year 1932		during the month		during the year 1932				
	Ports	Dealers	Estates of 100 acres and over	during the month	during the year 1932	during the month	during the year 1932	Foreign	From Malay States	Foreign	From Malay States	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :—																		
Federated Malay States	...	13,927	1,1958	12,947	140,525	10,082	93,371	Nil	Nil	Nil	Nil	12,938	7,964	163,669	72,223	...	14,718	13,273
Johore	...	2,751	3,084	4,046	44,043	4,137	42,712	Nil	5	Nil	74	980	7,041	11,767	74,919	...	2,640	3,362
Kedah	...	825	1,995	2,770	27,567	1,527	12,245	Nil	Nil	Nil	Nil	665	3,077	7,938	31,106	...	835	2,540
Perlis	...	34	13	8	82	23	95	Nil	Nil	Nil	Nil	Nil	26	Nil	159	...	37	15
Kelantan ...	...	250	164	101	1,695	254	3,123	Nil	Nil	422	Nil	48	440	586	4,585	...	160	121
Trengganu ...	...	55	50	75	1,210	38	607	Nil	Nil	Nil	Nil	Nil	113	Nil	1,817	..	55	50
Total Malay States	...	17,842	17,264	19,947	215,122	16,061	152,153	Nil	5	422	74	14,631	18,661	183,960	184,809	...	18,445	19,361
STRAITS SETTLEMENTS																		
Malacca ...	...	4,339	1,315	1,620	16,472	2,473	24,877	3	18,695	3	185,031	3,287	Nil	48,228	Nil	...	5,697	1,512
Province Wellesley	...	192	652	585	5,520			Nil		Nil						...	145	593
Dindings ...	...	67	68	106	1,106			Nil		Nil		4,998		61,768		...	33	86
Penang	1,150	4,492	15	4	34			683		5,114						2,231	5,046	10
Singapore ...	3,524	20,314	207	178	1,853			7,110		67,173		17,202		184,296		3,827	19,823	215
Total Straits Settlements	4,674	29,404	2,257	2,493	24,985	2,473	24,877	7,796	18,695	72,290	185,031	25,487	Nil	294,262	Nil	6,058	30,744	2,416
TOTAL MALAYA	4,674	47,246	19,521	22,440	240,107	18,534	177,030	7,796	18,700	72,712	185,105	40,118	18,661	478,252	184,809	6,058	49,189	21,777

TABLE II
DEALERS' STOCKS, IN DRY TONS 6

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Total
20	21	22	23	24	25	26
DRY RUBBER	11,517	18,096	4,537	5,680	1,007	40,837
WET RUBBER	3,201	1,727	509	195	1,633	7,265
TOTAL ..	14,718	19,823	5,046	5,875	2,640	48,102

TABLE III
FOREIGN EXPORTS

PORTS	For month	during the year 1932
Singapore ...	25,242	298,857
Penang ...	8,429	107,867
Port Swettenham.	5,609	61,473
Malacca ...	838	10,055
MALAYA ...	40,118	478,252

TABLE IV
DOMESTIC EXPORTS 7

AREA	For month	during the year 1932
Malay States ...	32,363	405,209
Straits Settlements		
MALAYA ...	32,363	405,209

Notes :—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [19A]—[2]—[3]—[4]—[5]—[9]—[10]. For the Straits Settlements, Columns [7] and [8] represent purchases by dealers from local estates of less than 100 acres, reduced by 15% to terms of dry rubber.

3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15%; wet sheet, 25%; scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.

4. Domestic exports are estimated by deducting the average monthly dry weight of foreign imports over a period of 2 months from the gross foreign exports of the later month, the foreign exports of the Malay States being domestic production.

5 The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 21st of January 1933.

METEOROLOGICAL SUMMARY, MALAYA, DECEMBER, 1932.

Locality	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes						Total		Most in a day	Number of days					Total	Daily Mean	Per cent
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .05 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hr.	hr.	%
Railway Hill, Kuala Lumpur, Selangor ...	89.8	71.8	80.8	93	69	82	74	82.9	83.7	10.57	268.5	2.32	20	16	3	3		196.25	6.33	53
Bukit Jeram, Selangor ...	87.3	72.5	79.9	89	70	81	75	83.0	84.9	10.43	264.9	2.54	17	16	5			219.35	7.08	60
Sitiawan, Perak ...	89.0	72.0	80.5	92	70	87	75	83.1	83.8	5.59	142.0	1.95	11	9	3	2		230.05	7.42	62
Kroh, Perak ...	84.5	68.5	76.5	91	65	79	71	75.9	80.7	1.00	25.4	0.39	9	7				185.20	5.97	51
Temerloh, Pahang ...	86.6	71.7	79.1	92	67	80	74	83.3	84.6	1.74	44.2	0.53	10	9		2		191.05	6.16	52
Kuala Lipis, Pahang ...	85.6	70.6	78.1	89	69	78	73	81.9	83.1	3.99	101.4	0.67	20	15	1	17		143.85	4.64	39
Kuala Pahang, Pahang ...	83.8	73.9	78.8	87	71	77	79	82.7	84.1	6.62	168.2	1.78	18	12	1		3	182.05	5.87	49
Mount Faber, Singapore ...	86.7	72.8	79.7	90	71	80	75	80.7	82.3	2.46	62.5	0.83	15	11	1			178.70	5.76	48
Butterworth, Province Wellesley ...	87.0	72.5	79.7	90	70	84	76	83.1	84.0	1.49	37.9	0.52	6	4		1		238.85	7.70	65
Bukit China, Malacca ...	85.1	73.2	79.1	88	72	77	75	81.3	82.6	1.53	38.9	0.38	12	7				202.65	6.54	54
Kluang, Johore ...	85.9	71.1	78.5	91	68	78	73	80.4	81.7	4.61	117.1	1.20	15	10		6		164.40	5.30	44
Bukit Lalang, Mersing, Johore	82.5	72.6	77.5	89	70	74	76	79.1	80.2	13.77	349.8	2.55	24	22				167.80	5.41	45
Alor Star, Kedah ...	87.0	71.3	79.1	91	66	83	74	82.9	84.4	1.05	26.7	0.54	6	5		2		206.05	6.65	56
Kota Bahru, Kelantan ...	83.3	72.4	77.9	88	69	76	77	81.4	83.0	15.76	400.3	3.42	20	16	1			140.60	4.54	38
Kuala Trengganu, Trengganu	82.6	71.9	77.3	86	69	76	76	79.2	81.1	18.39	467.1	6.38	25	20				141.75	4.57	39
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. Pahang ...	70.6	57.5	64.1	75	54	67	60			4.85	123.2	0.89	20	14		1		141.60	4.57	38
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	71.3	56.4	63.9	75	46	68	61	68.3	68.8	4.02	102.1	0.75	19	14	2	9		134.05	4.32	36
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	70.0	60.1	65.1	77	57	64	63	70.3	70.9	9.14	232.2	1.61	20	18		19		129.80	4.19	35

Compiled from Returns supplied by the Meteorological Branch, Malaya.